

Development of a Better Method to Identify and Measure Perchlorate in Drinking Water

Elizabeth Hedrick
Research Chemist
ORD, NERL
(513) 569-7296
hedrick.elizabeth@epa.gov

Key Words: perchlorate, drinking water, mass spectrometry

Perchlorate (ClO_4^-) is an oxidant used primarily in solid propellant for rockets, missiles, pyrotechnics, as a component in air bag inflators, and in highway safety flares. Perchlorate-tainted water has been found throughout the southwestern United States where its source has often been traced to defense industry activity or to manufacturers who supply the defense industry. While there are other sources of perchlorate in drinking water, the connection of perchlorate to the defense industry has garnered increased media attention to the issue of perchlorate contamination. Perchlorate is a known thyroid hormone inhibitor; however, it was not until the mid-1990s that analytical methods were available for the detection of perchlorate in drinking water at levels of human health concern. As analytical methods have improved in sensitivity, the discovery of perchlorate in drinking waters at lower and lower concentrations has increased. Collaborative research between EPA's Office of Research and Development and the Office of Water has produced a method that is capable of identifying concentrations of perchlorate in drinking water 10 times lower than previous methods. The most distinguishing feature of this method, which is not available in existing methods, is the capability to identify perchlorate by its chlorine isotope ratio. This isotopic ratio, in addition to separation of perchlorate from interferences, virtually eliminates the likelihood of mistaken identity. Should perchlorate become regulated in drinking water, this method will enable unmistakable identification and quantitation of perchlorate at concentrations as low as 0.1 part per billion.